PREDICTING DRY MATTER INTAKE AND MANURE PRODUCTION OF GRAZING DAIRY COWS

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Introduction

Rotational grazing has become a well established method for feeding animals on Wisconsin dairy farms. Currently over 20% of Wisconsin dairy farmers use rotational grazing for feeding animals during the growing season. (Ostrom, 2000) Milk production on dairy farms utilizing rotational grazing is typically lower than that from conventional farms. Kriegl has shown 5000 lb/cow less milk from rotationally grazed cows (Kriegl, 2005). This is in part related to less feed intake and also to smaller cow size compared to conventional farms. The same study has shown increased profit per cow and per cwt on grazing farms.

Manure production estimates are an important part of nutrient management planning. Estimates for cows in confinement range from 106 to 148 depending on cow size. Due to smaller size and lower feed intakes these estimates may not be accurate for grazing dairy cows. The current study began in 2003 to determine pasture intakes and manure production from dairy cows on pasture in an effort to develop more accurate nutrient management planning capabilities for these farms.

Materials and Methods

Seven grazing dairy farms throughout Wisconsin were selected to participate in the study. Prior to a grazing event, pasture samples were obtained for quality analysis. Yield estimates were made by clipping the pasture before and after grazing. Supplemental feed levels were documented and feeds sampled. Milk yields during the grazing period were determined from bulk tank measurements. Milk and manure samples were obtained and analyzed.

Intake Estimates

Intakes were estimated by a net energy balance where net energy intake from supplemental feed was known. Total energy excreted in milk was also known. The difference was net energy provided from pasture intake. As net energy concentration of pasture was also known we were able to calculate the amount of pasture intake required to provide the net energy difference between that from concentrate and that excreted in milk.

Manure Production Estimates

Manure production was estimated based on total phosphorus intake and excretion. Phosphorus concentration of all feeds was determined through testing. Total feed consumption was known as described previously. Thus total phosphorus intakes could be determined. Phosphorus excretion would be either through milk or manure. Phosphorus excretion in milk was determined through sampling and bulk tank measurements. Phosphorus excreted in manure would be the difference between P intake and P excretion in milk. Phosphorus concentrations in manure were determined through testing. Thus, we were able to calculate the amount of manure production required to excrete that amount of phosphorus.

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Results and Discussion

The results of the quality sampling are shown in Table 1. The quality was quite consistent from sample date to sample date indicating that variation in pasture quality is low providing the pastures are well managed and grazed at the proper height as these were. The pasture quality was quite high. Crude Protein (CP), Neutral Detergent Fiber (NDF), NDF Digestibility (NDFD), Net Energy (NEl) and Relative Forage Quality all met or exceeded that of bud stage alfalfa. NEl values were similar to corn silage. This indicates that the decreased milk production experienced by many grazing farms relative to confinement dairies is not related to low forage quality.

Table 1. Quality of pastures forage samples

Year	CP	NDF	NDFD	NEl	RFQ
	-----------------------%----------------------			Mcal/lb	
2003	19.8	44.6	63.3	0.74	187
2004	21.0	43.3	61.1	0.75	208
2005	22.9	40.7	69.7	0.75	209

Intake data are presented in Table 2. Pasture intake was again consistent form year to year at approximately 20 lb/cow/day. Supplemental feeds consisted mainly of corn grain and occasionally dry hay or haylage. Total intake averaged 36 lb/cow/day. This intake level is sufficient to support the 51 lb/cow/day milk production which was observed on these farms. In order to produce more milk, even with the high forage quality, these cows would need to eat significantly more feed. This relatively low intake is likely the caused of decreased milk production on grazing farms.

Table 2. Pasture, supplement and total intake and milk production of 7 grazing herds.

Year	Intake			Milk production
	Pasture	Supplement	Total	
	----------------------------lb/day---------------------------------			
2003	20.8 ± 3.1	15.5	36.3	48.8
2004	20.5 ± 2.3	14.9	35.7	52.7
2005	20.0 ± 2.7	16.4	36.4	52.4
AVE	20.3 ± 1.9	15.6	36.1	51.3

Manure production by cows in these herds averaged 85.5 lb/cow/day (Table 3). This is significantly less than the current values used for nutrient management planning. Those standards call for a 1000 lb and 1400 lb lactating cow to produce 106 lb and 148 lb of manure/day respectively. (ASAE, 1993) The cows in this study weighed 1200 lb on average.

Table 3. Phosphorus content and total manure production by grazing dairy cows

Year	P2O5	Manure .
	lb/ton	lb/cow/d
2003	6.0 ± 0.8	77.5 ± 13.3
2004	7.1 ± 0.9	88. 7± 20.8
2005	5.6 ± 0.6	90.3 ± 8.8.
Ave	6.4 ± 0.5	86.4 ± 10.4.

Conclusion

Nutrient management planning for grazing dairy farms needs a different approach than that for confinement dairies. Manure deposition by cows on pasture needs to be considered when calculating the total nutrient load. This is done by determining how many cows were on a given paddock and for how long. Manure deposition may then be determined by multiplying these values by the pounds of manure produced per cow per day. The results of this study suggest that the current manure production values are too high for a typical grazing cow and that a value of 85 lb/cow/day is more appropriate.

References

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